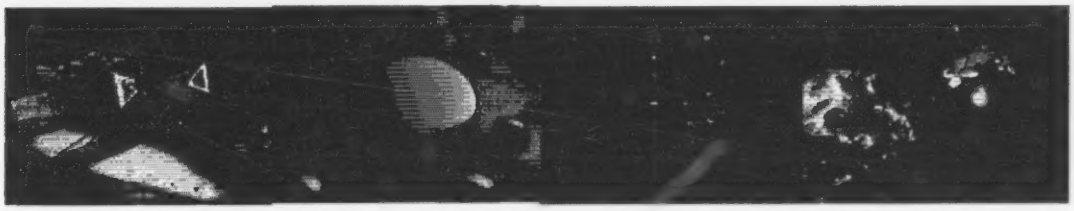
Agence spatiale canadienne | Canadian Space Agency

Canada

THE CANADIAN SPACE AGENCY

2012-13 Estimates

REPORT ON PLANS AND PRIORITIES



Minister of Industry and
Minister of State (Agriculture)

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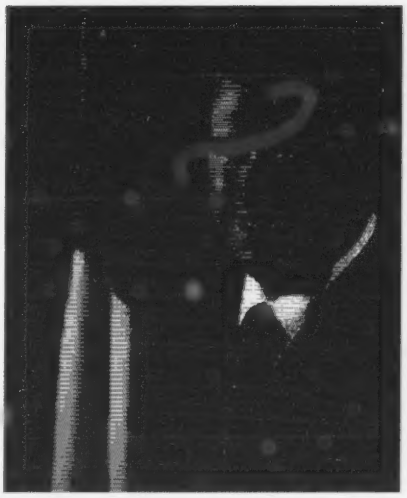
MINISTER'S MESSAGE



Over the past year, the Canadian economy has proven to be resilient despite continued fiscal uncertainty in other parts of the world. Since our government introduced Canada's Economic Action Plan in 2009 to respond to the global recession, Canada has recovered not only all of the jobs lost during the recession but also all of our economic output.

As Minister of Industry, I am confident that the Industry Portfolio will play a key role in our government's plan to strengthen Canada's knowledge-based economy. Our efforts will focus on promoting innovation and modernizing Canada's marketplace policies, among other areas.

In 2012–13, the Canadian Space Agency will remain committed to pursuing the development of leading-edge technologies to enhance surveillance of our nation's vast resources, especially the Arctic and our coastlines. Canada's continued participation in international space collaborations, such as the International Space Station, will sustain its position as a sophisticated research and innovation leader and provide a valuable advantage for Canadian firms on the global stage in several niche technology areas, including robotics.

A significant part of the Industry Portfolio's activities will involve developing Canada's digital economy by updating copyright and privacy laws and building a world-class digital infrastructure for next-generation wireless technologies and services. We will also put in place conditions that allow small businesses to grow and create jobs. This will mean reducing red tape, improving access to credit and focusing programs to promote more effective research and development.

Since coming to office, our government has made science and innovation a priority. We will leverage our past investments and continue to develop and recruit world-leading research talent. We will also take measures to encourage the private sector to increase research and development investments and improve commercialization outcomes.

In our government's pursuit to improve the well-being of Canadians, we will continue to work to secure the recovery, eliminate the deficit and invest in the drivers of long-term economic growth. We will also implement our plan to find savings in government expenditures to return to fiscal balance in the medium term.

This year's Report on Plans and Priorities for the Canadian Space Agency delivers a comprehensive approach to promote and maintain Canada's strong and competitive economy. I look forward to working with my Cabinet and departmental colleagues, as well as with the private sector and other levels of government, to achieve our common goal of creating jobs and growth for all Canadians.

The Honourable Christian Paradis
Minister of Industry and
Minister of State (Agriculture)

PRESIDENT'S MESSAGE

Fifty years ago Canada launched Alouette-1, becoming the third country in the world to have a satellite in space and inspiring a nation to harness space science and technology for the benefit of its people. Canada's use of space since that launch has ranged from scientific research to telecommunications and has lead to a world-class space industry.

Today our advanced robotics systems for the International Space Station and the RADARSAT-2 satellite have been completed and deployed, and other assets such as RADARSAT-1, OSIRIS, and SCISAT continue to deliver important data well beyond their planned lifetimes.

In the coming year, we will pursue the development of leading-edge technologies such as the RADARSAT Constellation, a fleet of Earth observation remote-sensing satellites. The critical images of these satellites will help secure Canada's safety, sovereignty and security by supporting the operational needs of many government departments and agencies, especially in the Arctic.

In keeping with the Canadian Space Agency's objective to increase efficiency without increasing cost, two small satellites with important benefits for life on Earth will be launched this year. CASSIOPE/CASCADE, will offer solutions to high-speed data transfer while collecting information about the effects of solar storms and their harmful impact on radio communications, satellite navigation. The Near-Earth Object Surveillance Satellite (NEOSSat) will collect data on Near Earth-orbiting objects (asteroids) and track man-made objects (spacecraft and space debris), sending back early warning of asteroids approaching Earth or debris that poses a danger to orbiting satellites. This satellite is jointly sponsored by the Canadian Space Agency and the Department of National Defence's Research and Development Canada.

Canada continues to be an important partner in humankind's largest international project, the International Space Station, using our robotics to help maintain the Station and performing scientific experiments in partnership with universities across the country. This year, Canadian astronaut Chris Hadfield will become the first Canadian to command the International Space Station during his 6-month mission. When the NASA Curiosity rover lands on Mars this year, Canada will be part of the international collaboration that will study the planet's geology to help ascertain the potential habitability of Mars.

Through strategic investment in niche technologies and critical missions, the Canadian Space Agency has been able to focus its resources in areas that meet government priorities and yield the highest scientific and technological results. In the ongoing pursuit of our mandate, we present the Canadian Space Agency's Report on Plans and Priorities outlining our key initiatives, priorities and expected outcomes for the upcoming year.

Steve MacLean
President

SECTION 1: OVERVIEW

1.1 RAISON D'ÊTRE AND RESPONSIBILITIES

The mandate of the Canadian Space Agency (CSA) is *"to promote the peaceful use and development of space, to advance the knowledge of space through science and to ensure that space science and technology provide social and economic benefits for Canadians"*.

The CSA is achieving this mandate in collaboration with Canadian industry, academia, Government of Canada (GoC) organizations, and other international space agencies or organizations. Such partnering maximizes the economic, scientific, and technological benefits and enhances synergies between institutions across the country and with other nations.

CSA in brief in 2012-2013

President: Steve MacLean

Minister of Industry:
The Honourable Christian Paradis

Budget: $388.3 million

Headquarters:
Saint-Hubert, Quebec

Employees: 687 FTEs

The founding legislation voted in 1990 attributed four main functions to the CSA:

- Assisting the Minister in the coordination of the space policies and programs;
- Planning and implementing programs and projects related to scientific or industrial space research and development, and application of space technology;
- Promoting the transfer and diffusion of space technology to and throughout Canadian industry; and,
- Encouraging commercial exploitation of space capabilities, technology, facilities and systems.

To learn more about the founding legislation and mandate of the CSA, go to: http://www.asc-csa.gc.ca/eng/about/mission.asp

The Canadian Space Strategy approved by the Government of Canada in February 2005 continues to guide the CSA in the development and leveraging of Canada's investments in space satellites, systems, instruments, applications and data. The Strategy is instrumental in focusing decision-making and aligning program activities with the CSA's strategic outcome.

To learn more about the Canadian Space Strategy, go to:
http://www.asc-csa.gc.ca/eng/publications/default.asp#strategy

The release, in 2007, of the Government's Science and Technology Strategy – *Mobilizing Science and Technology to Canada's Advantage* – provides the CSA with a solid framework with which to prioritize its programs and initiatives to *"make Canada a world leader in science and technology and a key source of entrepreneurial innovation and creativity"*.

To learn more about Canada's Science and Technology Strategy, go to:
http://www.ic.gc.ca/epic/site/ic1.nsf/en/h_00231e.html

CSA Organizational and Governance Structure

The Canadian Space Agency (CSA) was established in 1989 and its headquarters is located at the John H. Chapman Space Centre, in St-Hubert, Quebec. A government liaison office is located in Ottawa, Ontario and the Agency has offices in Houston, Texas, Washington, D.C. and Paris, France to effect liaison with partner space agencies. The CSA operates the David Florida Laboratory (DFL), Canada's world class spacecraft assembly, integration and testing centre located in Ottawa, Ontario.

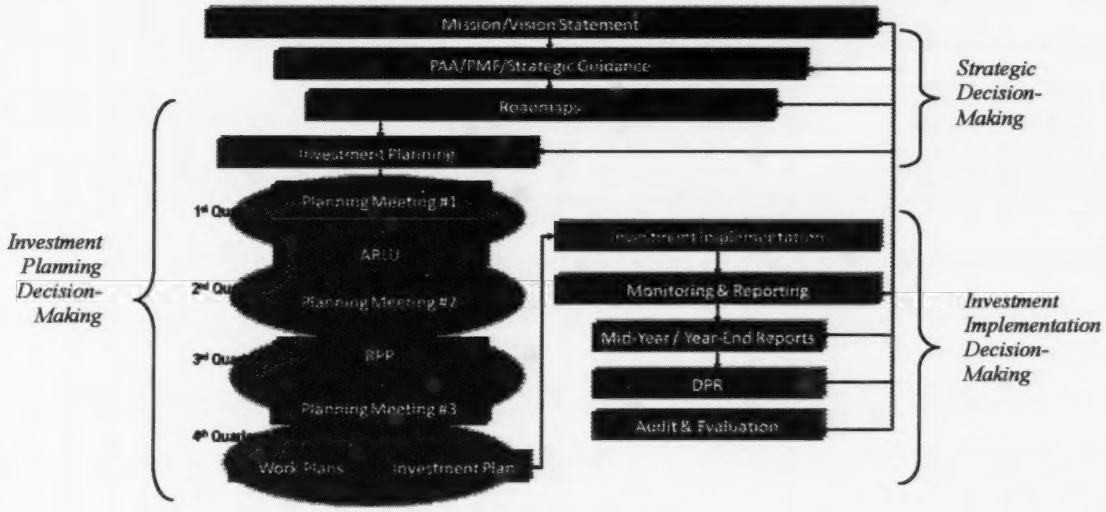
Reporting to the Minister of Industry, the President is the CSA's Chief Executive Officer. The President is assisted by eight executive officers: the Vice-President, four Directors General (Space Utilization, Space Exploration, Space Science and Technology, Corporate Services), the Chief Financial Officer, the Chief Human Resources Officer, and the Director of Communications and Public Affairs.

Chaired by the President, the Executive Committee is the ultimate decision-making body where the strategic orientations, program priorities, major investments as well as the selection of projects and their continuation are approved. At the strategic level, Government stakeholders are regularly and increasingly consulted, particularly at the Deputy Minister and Associate Deputy Minister levels. Major space related issues are brought to the Deputy Minister ad-hoc Science and Technology committee for discussions between government departments who have a stake in those services coming from space which are needed to support their mandate. These important consultations help the CSA determine the governmental needs and priorities related to space. Similar consultations are also held with leaders of Canadian academia, industry and with our international partners in order to assist the CSA in determining the optimal program and project portfolio.

CSA Governance Process

In 2011-2012 the CSA mapped its governance process to identify and prioritize investments in support of its strategic outcome and the Government priorities spelled out in its new April 2011 Program Activity Architecture. The exercise revealed the Integrated Investment Governance Framework on the next page. Although a thorough review of the CSA governance is projected to continue into 2012-2013, this framework endorsed by the Executive Committee in May 2011, proposes that its future governance structure includes three decision-making levels: a Strategic level, an Investment Planning level, and an Investment Implementation level.

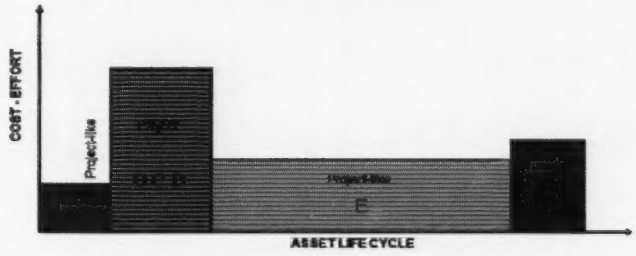
Proposed Integrated Investment Governance Framework



CSA Project Approval and Development Process

As most activities are project-driven, the CSA currently disposes of a single project management methodology: the Project Approval and Management Framework, the last version of which was approved by Treasury Board (TB) in 2005. This framework instructs managers regarding project approval and development in a manner which enables the CSA to align its activities with TB policies and with those of its major international partners, easing communication, integration and tracking. Each phase of the development process depicted on the figure below corresponds to a Go or No-Go decision point rendered by the Executive Committee. Note that the Project Phases B, C and D correspond to the TB policy on the Management of Project.

Project Development Phases



Phase 0: Unique to space assets development, this phase is used to study concepts. It includes feasibility studies and requirements definition. It aims at deciding about the pursuit of a mission. Many concepts in Phase 0, will never continue through subsequent phases for reasons of technical merit and feasibility, cost, priorities or resources.

Phase A: Also unique to space assets development, this phase aims at defining the system requirements. It includes concept and technology development activities. The phase A ends with a System Requirement Review milestone.

Phase B: This phase establishes the preliminary design according to the technical requirements elaborated in Phase A. It generally ends with a Preliminary Design Review milestone.

Phase C: This phase is used to finalize the design, and concludes with a Critical Design Review milestone.

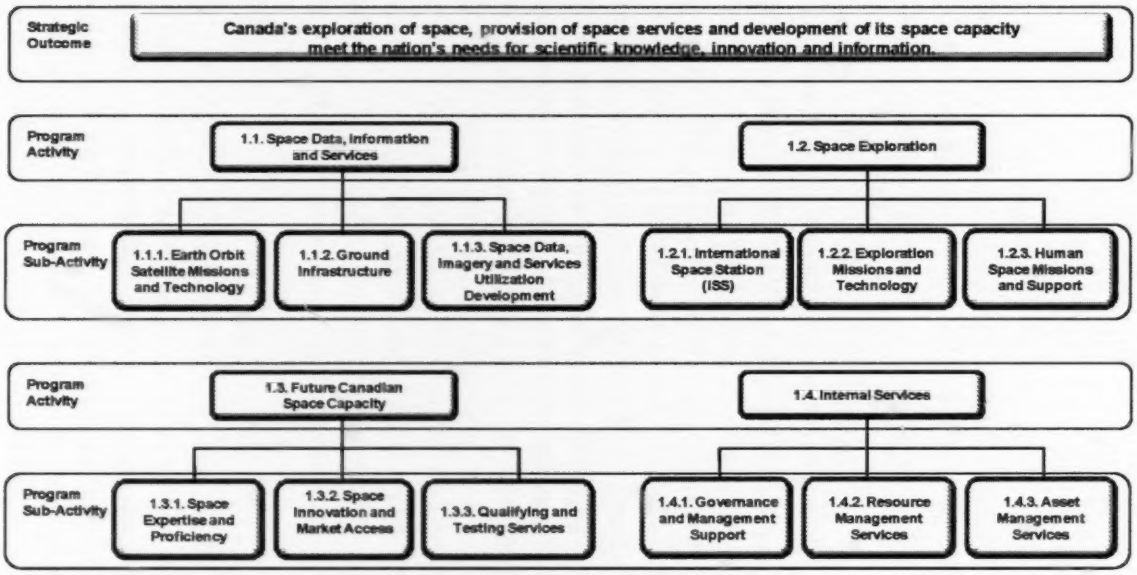
Phase D: This phase constitutes the manufacturing, integration and testing phase. An Acceptance Review is conducted within this phase, and other reviews may also be required. For space assets, this phase includes the launch, preliminary operations and commissioning, and project close-out activities.

Phase E: Activities in this phase include system operations and maintenance, and may include project warranty and development activities that have been formally transferred to operations and maintenance officers. In some rare cases, this phase may include launch and acceptance in orbit, if these stages are not executed as part of Phase D.

Phase F: This phase represents disposal of a system at the end of its useful life. This includes the ground segment and space segment components. The requirement to dispose of space segment is relatively new, and aims at minimizing the accumulation of space debris.

1.2 STRATEGIC OUTCOME AND PROGRAM ACTIVITY ARCHITECTURE

Canadian Space Agency's 2012-2013 Program Activity Architecture (PAA)


Strategic Outcome
Canada's exploration of space, provision of space services and development of its space capacity meet the nation's needs for scientific knowledge, innovation and information.
Program Activity
1.1. Space Data, Information and Services
1.2. Space Exploration
Program Sub-Activity
1.1.1. Earth Orbit Satellite Missions and Technology
1.1.2. Ground Infrastructure
1.1.3. Space Data, Imagery and Services Utilization Development
1.2.1. International Space Station (ISS)
1.2.2. Exploration Missions and Technology
1.2.3. Human Space Missions and Support
Program Activity
1.3. Future Canadian Space Capacity
1.4. Internal Services
Program Sub-Activity
1.3.1. Space Expertise and Proficiency
1.3.2. Space Innovation and Market Access
1.3.3. Qualifying and Testing Services
1.4.1. Governance and Management Support
1.4.2. Resource Management Services
1.4.3. Asset Management Services

DESCRIPTION OF PROGRAM ACTIVITIES AND SUB-ACTIVITIES

The full description of Program Activities and Sub-Activities taken from the Main Estimates are available online at: http://www.tbs-sct.gc.ca/est-pre/estime.asp

1.1. Space Data, Information and Services: This Program Activity includes the provision of space-based solutions (data, information and services) and the progression of their utilization. It also serves to install and run ground infrastructure that processes the data and operates satellites.

- **1.1.1. Earth Orbit Satellite Missions and Technology:** This Sub-Activity (SA) is necessary because Government of Canada (GoC) organizations use satellite-generated data, information and services to deliver their mandate; and so do academia to perform their research.
- **1.1.2. Ground Infrastructure:** This SA is necessary to operate satellites as well as to process and make available space-based data received by the Canadian Space Agency to assist GoC organizations in delivering their mandate.
- **1.1.3. Space Data, Imagery and Services Utilization Development:** This SA is necessary to foster the development of a Canadian value-added industry that turns space data and information into readily useable products, as well as to increase the ability of GoC organizations to use space-based solutions (data, information and services) for the delivery of their mandate and to increase the ability of academia to perform their research.

1.2 **Space Exploration:** This Program Activity provides valuable Canadian science, signature technologies and qualified astronauts to international space exploration endeavours.

- **1.2.1. International Space Station (ISS):** This SA is necessary to generate specific understanding and technological advances to prepare for the challenges of space exploration and for terrestrial benefits. This SA provides Canadian industry and academia privileged access to the ISS.
- **1.2.2. Exploration Missions and Technology:** This SA is necessary as it contributes valued Canadian signature technologies to international space exploration endeavours and generates a better understanding of the universe, the solar system and our home planet.
- **1.2.3. Human Space Missions and Support:** This SA is necessary to generate specialized knowledge in fields that sustain human space flights, such as life sciences and space medicine.

1.3 **Future Canadian Space Capacity:** This Program Activity attracts, sustains and enhances the nation's critical mass of Canadian space specialists, fosters Canadian space innovation and know-how, and preserves the nation's space-related facilities capability. In doing so, it encourages private-public collaboration that requires a concerted approach to future space missions.

- **1.3.1. Space Expertise and Proficiency:** This SA is necessary to create and sustain a pool of space expertise and proficiency that will form the next generation of space professionals and workers, continuously able to provide solutions for future Canadian space endeavours.
- **1.3.2 Space Innovation and Market Access:** This SA is necessary to foster entrepreneurship that enhances Canadian industry's international positioning on commercial and government markets.
- **1.3.3. Qualifying and Testing Services:** This SA is necessary to ensure that mission-assigned technology and entire systems can safely and reliably meet the rigors of space and to demonstrate the suitability and effectiveness of new Canadian space technology for providing valuable contributions to space missions.

1.4 **Internal Services:** This program activity is necessary to implement the government's commitment to modern public service management. It directly supports the Management Accountability Framework. Internal Services include only those activities and resources that apply across an organization in the areas of:

- **1.4.1. Governance and Management Support** which includes Management and Oversight Services, Communications Services and Legal Services.
- **1.4.2. Resource Management Services** which includes Human Resources Management Services, Financial Management Services, Information Management Services, and Information Technology Services.
- **1.4.3. Asset Management Services** which includes Real Property Services, Material Services and Acquisition Services.

1.3 PLANNING SUMMARY

CANADIAN SPACE AGENCY STRATEGIC OUTCOME

Canada's exploration of space, provision of space services and development of its space capacity meet the nation's needs for scientific knowledge, innovation and information.

PERFORMANCE INDICATORS

1. **Depth and width of needed scientific knowledge**

The depth and width of knowledge, generated in part through the CSA's support, is primarily based on the analysis of the following factors:

- Production of knowledge is measured by the number of publications and can be broken down by field of knowledge and referred to invested funds.
- Dissemination of knowledge is measured by the number of cited publications which can also be broken down by field of knowledge and by type and extent of the audience reached.
- Relevance of knowledge is measured, among others, by the number of publications listed under areas of knowledge previously targeted by the CSA.

2. **Space generated innovation index**

Innovation, generated in part through the CSA's support, is primarily based on the analysis of the following factors in the specific context of space:

- Idea generation which results in the creation of new knowledge, technologies, processes or their subsequent improvements.
- Idea development that can take the form of prototypes, scientific instruments and experiments.
- Commercialization and utilization measured by the number of applications developed and used or data requested and provided.

3. **Acknowledgement/success stories by Government of Canada organizations of impact on mandate delivery**

The recognition by Government of Canada (GoC) organizations of the impact on quality of programs and services delivery attributable to data utilization, information, research results, or space services lies in monitoring of Web information and public documents and depends on the cooperation of participating organizations.

To learn more about the Strategic Outcome Measurement, go to Section 2: Analysis of Program Activities by Strategic Outcome.

RESOURCES	2012-2013	2013-2014	2014-2015
FINANCIAL ($ in millions)	388.3	309.7	289.1
HUMAN (FTEs)	687.0	687.0	687.0

With the end of the Canada's 2009 Economic Plan *Stimulus* initiative where funding was provided to the CSA to advance space robotics for exploration and with the upcoming conclusion of the design phase of the RADARSAT Constellation Mission (RCM), the CSA is seeing its funding returning to its A-Base budget. The CSA will continue to:

1. Provide the Government of Canada with space-based data that is critical to its operations. Key users of space data include Department of National Defence (DND) (security, maritime defence), Environment (weather, ice monitoring), Natural Resources Canada (NRCan) (disaster monitoring, natural resources management).
2. Explore space through its contributions to international efforts such as the International Space Station (ISS).
3. Ensure that Canadian has the talent and the research to develop the next generation of space products and services.
4. Review its internal services activities to fine-tune its efficiency while addressing central agencies planning and reporting requirements.

PROGRAM ACTIVITY ALIGNMENT TO GOVERNMENT OF CANADA OUTCOMES					
Program Activity ($ in millions)	**Forecast Spending 2011-2012**	**Planned Spending**			**Government of Canada Outcomes**
		2012-2013	**2013-2014**	**2014-2015**	
Space Data, Information and Services	128.2	173.7	98.7	78.4	Well-managed and efficient government operations
Space Exploration	151.0	106.3	93.6	93.0	An innovative and knowledge-based economy
Future Canadian Space Capacity	81.5	63.3	70.8	70.9	An innovative and knowledge-based economy
Internal Services	56.1	45.0	46.6	46.8	N/A
TOTAL	**416.8**	**388.3**	**309.7**	**289.1**	

Note: Due to rounding, decimals may not add up to totals shown.

Contributions of Program Activities to Government of Canada outcomes are described in Section 2 of the "*Analysis of Program Activities by Strategic Outcome - Detailed Information*" posted on the CSA's website at:
http://www.asc-csa.gc.ca/asc/eng/resources/publications/default.asp#parliament

Contribution of Priorities to the CSA Strategic Outcome

STRATEGIC OUTCOME: *"Canada's exploration of space, provision of space services and development of its space capacity meet the nation's needs for scientific knowledge, innovation and information."*

Using space efficiently and strategically is critical to Canada. Our vast and sparsely populated territory, long coastlines and rigorous climate make it imperative that we exploit space to observe, monitor and communicate. Over the past decades, the Government of Canada has been increasingly reliant on space to meet key public policy objectives related to sovereignty, security and safety, resources, the environment, the digital economy, and knowledge and innovation in ways not otherwise possible. Space has become a critical infrastructure that underpins Canada's economy and affects the life of every Canadian – a day without space would be a difficult day indeed for Canadians. Space exploration is one of the instruments of innovation essential in ensuring the prosperity of our country.

Our advanced robotics systems for the International Space Station and the RADARSAT-2 satellite have been completed and deployed. Most of our other existing space assets are beyond their life expectancy and need renewal. Moreover, the generation of Canadian space specialists that have made Canada a space-faring nation will be retiring over the next few years: this reality places our essential and hard won space capacity at risk and has motivated the Government of Canada to develop strategies for the sustained and effective use of space.

Spearheaded by the CSA, these strategies have been devised with fourteen government departments in collaboration with senior representatives from over forty Canadian firms involved in the space business, twenty major Canadian universities and a host of national space agencies around the world. As a result, the CSA is guided by a vision and strategic directions that, taken together, will provide a framework for the continued effective use of space by Canada in the future. Our renewed space vision has been conceived for a country:

- where governments, academia, businesses and citizens have timely access to relevant, reliable and high-quality data, knowledge, information and services from a variety of space assets, both domestic and foreign;
- that takes advantage of its favourable northern location to become an international hub for space data reception;
- that uses the challenges of space exploration as a powerful driver for knowledge and innovation;
- that provides exciting business and job opportunities in leading-edge space science and technology sectors; and,
- that uses space to address its public policy objectives, global challenges and to take its place in the world.

Since April 1, 2011, the CSA's priorities have been guided by a strategic direction for each of the CSA Program Activities:

Provide space data, services and information for Canadians: The CSA will develop and help the utilization of space-based solutions and research data to assist Government of Canada (GoC) organizations.The space solutions will contribute to the delivery of growing or cost-effective programs and services related to key national priorities, such as sovereignty, defence, safety and security, resource management, environmental monitoring and the North.

Foster knowledge and innovation through space exploration: The CSA will support the development of valuable Canadian science, signature technologies and qualified astronauts to international space exploration endeavours. It will support the development of space technologies and knowledge with potential for terrestrial benefits mainly through the optimal utilization of the International Space Station and the demonstration of advanced robotics technologies.

Sustain and enhance Canada's space capacity: The CSA will attract, sustain and enhance the nation's critical mass of Canadian space specialists, know-how, space related facilities to preserve Canada's capability to deliver internationally renowned space assets for future missions and secure Canada's strategic presence in space.

These strategic directions call for a collaborative effort formalized under national and international partnerships with international space agencies, the Canadian space industry, academia, GoC organizations, not-for-profit organizations and provincial governments.

The CSA will mobilize its resources towards the following goals:

1. Complete ongoing projects within budget and on time.
2. Ensure the integrity and reliability of key services provided to users of space data.
3. Maintain strong international partnerships to ensure that Canada remains a partner of choice for space.
4. Invest in Research and Development (R&D) that shows promise of providing the foundation for future space missions and services.

1.4 ORGANIZATIONAL PRIORITIES

Program Activity – Space Data, Information and Services

Planned Spending ($ in millions)		
2012-2013	**2013-2014**	**2014-2015**
173.7	98.7	78.4

Contribution of the Program Activity to the CSA Strategic Outcome

The contributions of this Program Activity to the strategic outcome are expected to result in an expanded use of space data, applications and information by government departments and agencies so that they can better deliver their policy and programs and perform their operational responsibilities effectively. This calls for a strong partnership between the CSA and Government of Canada (GoC) organizations. The reduction in funding over the next three fiscal years reflects the completion of the design phase of the RADARSAT Constellation Mission.

Priorities	Type
#1 Further the development of the RADARSAT Constellation in order to provide continuity and enhanced functionalities to the users of RADARSAT-1 and RADARSAT-2. Ground stations located in the Canadian Arctic are required to take full advantage of the RADARSAT Constellation and to receive data from various Canadian and foreign satellites.	Ongoing
#2 Further study the development of the Polar Communication and Weather (PCW) mission. This key space asset will provide the sole broadband communications services and weather observations in the Canadian Arctic to support the Canadian Forces' operations, and help Government of Canada organizations foster social and economic development in the high Arctic.	Previously Committed

Why these are priorities

The CSA, together with Government of Canada organizations, needs to ensure that the country strategically selects, builds and operates the space assets and the necessary ground infrastructure to ensure continuity of availability of high-quality space data, applications and services space essential for the provision of services to Canadians. These assets help the Government address key priorities: the Arctic, defence, sovereignty, safety and security, resources and the environment; perform world-class science in and from space in priority areas. The Canadian space community will be called upon to innovate technically, scientifically, financially, as well as through a broader range of business practices.

Plans for meeting the priorities

- Finalize the design of the RADARSAT Constellation satellites.
- Determine feasibility and costs of required technology and analyse delivery mechanisms for the PCW mission.
- Foster an increased use of space data among government organizations dealing with peace and security, disaster management, climate observations, weather forecasting and trans-border pollution.

Program Activity – Space Exploration

Planned Spending ($ in millions)		
2012-2013	**2013-2014**	**2014-2015**
106.3	93.6	93.0

Contribution of the Program Activity to the CSA Strategic Outcome

The contributions of this Program Activity to the strategic outcome are expected to be advances in knowledge, exploration, technologies and expertise, as well as an increased use of this knowledge and know-how both in space and on Earth. The slight decrease in funding reflects the end of the 2009 *Stimulus* funding and the completion of space exploration projects.

Priorities	Type
#1 Canada will continue as an active partner and participant in the International Space Station, operating robotic elements such as Canadarm2 and Dextre, performing scientific experiments and technology demonstrations and having access to flight opportunities for Canadian astronauts.	Ongoing
#2 Fostering the development of scientific instruments, advanced space robotics and other technologies capable of contributing to international space exploration missions.	Ongoing

Why these are priorities

CSA's Space Exploration Program encompasses space astronomy, the International Space Station, human spaceflight, robotic exploration of the solar system, and advanced instruments and technologies development. Its successful execution requires the development of technologies and the underpinning science expertise. International cooperation leverages our investment and makes contributions by Canadian companies and scientists cost efficient. A key component of our program is the optimal utilization of the International Space Station for research in health science with high potential for terrestrial benefits; and for the demonstration of advanced robotics and laser imaging technologies to support industry's expertise and competitiveness while enabling Canada's participation in future exploration missions. Finally, Canadian signature technologies and Canadian astronauts make space exploration a source of national pride and an inspiration for scientific and engineering careers.

Plans for meeting the priorities

- Promote the use of the International Space Station for scientific research for the development and in-orbit demonstration of Canadian technologies and for Canadian astronauts.
- Using the Global Exploration Roadmap and CSA's own space exploration plans, implement Canadian participation in international missions in astronomy and planetary science and continue to position Canadian scientists and industry as strategic and cost efficient partners in upcoming missions.

Program Activity – Future Canadian Space Capacity

Planned Spending ($ in millions)		
2012-2013	**2013-2014**	**2014-2015**
63.3	70.8	70.9

Overall Contribution of the Program Activity to the CSA Strategic Outcome

The contributions of this Program Activity to the strategic outcome are aligned with the maintenance of the critical mass of academic, industrial and business expertise needed to address future national needs and priorities in space, as well as an increased pace of discovery, and innovation. The modest increase in funding is aligned with the importance attributed to the capacity development envisioned in the new Canadian space vision to sustain innovation in the space sector.

Priorities	Type
#1 The first priority is the implementation of the renewed cooperation agreement with the European Space Agency.	Ongoing
#2 The second priority is the development and use of sub-orbital platforms (balloons, aircraft and sounding rockets) and small satellites to increase the pace of training and scientific discovery.	Ongoing

Why these are priorities

The CSA must leverage the innovation capability of industry by enhancing synergy through international and national partnerships. Canada's collaboration with the European Space Agency enhances its technology base and improves access by Canadian space industries to European markets. National partnership implies the creation of clusters of excellence, the promotion of closer links between universities and industry in priority areas for the purpose of facilitating knowledge and technology transfer. The use of sub-orbital and very small orbital platforms is a highly cost-effective way to provide space researchers, especially graduate students, with frequent access to space and near-space in order to hone their skills, develop new technologies and produce research results. This calls for greater coordination between the CSA and the Granting Councils in order to facilitate the collaboration between Canadian universities working in partnership with the space industry and the government so that we can grow and develop our future space expertise and capacity.

Plans for meeting the priorities

- Give rise to strengthened partnerships between CSA and academia, industry and governments in priority areas for Canadians.
- Identify from the missions and programs roadmaps, the space technologies to be developed.
- Secure the privileged access by Canadians industry and academia to foreign space markets and assets.

Program Activity – Internal Services

Planned Spending ($ in millions)		
2012-2013	2013-2014	2014-2015
45.0	46.6	46.8

Contribution of the Program Activity to the CSA Strategic Outcome

The contribution of this Program Activity to the strategic outcome is expected to be a better management of programs and services in accordance with the Management Accountability Framework.

Priorities	Type
#1 The first priority is to complete the CSA governance review. Equally important will be the strengthening of internal processes, especially in project management and performance measurement contributing to a strong governance of programs and projects.	Ongoing
#2 The second priority is the final development and implementation of the Five-Year Investment Plan in accordance with Treasury Board Secretariat (TBS) policies on investment planning, assets, acquired services, and management of projects.	Ongoing

Why these are priorities

A strong governance structure and performance measurement regime will ensure that stakeholders' priorities are taken into account as early as possible in the planning process. A renewed documentation of project management directives and procedures will consolidate the internal capabilities of the CSA to manage, in the future, projects of increased complexity in accordance with the new Treasury Board policy on project management.

The CSA considers that a bolstered investment planning will ensure that resources are allocated in a manner that clearly supports program outcomes, responds to government priorities, and achieves affordable, productive and financially sustainable delivery of programs and projects.

Plans for meeting the priorities

- The governance review will be accomplished by defining the roles, responsibilities and interrelationships of government departments with a stake in the space sector, and by providing a framework for the deployment and use of space assets with multiple roles.
- Performance Measurement Strategies will continue to be developed for each Program Activity.
- The Five-Year Investment Plan will be developed in accordance with TBS policies on investment planning, assets, acquired services, and management of projects.

1.5 RISK ANALYSIS

Space has no frontier and is being exploited by a growing number of nations worldwide. Satellites from those nations overfly Canada and so do Canadian space assets. It is natural to form partnerships to optimize the use of orbiting platforms. While such associations create opportunities for efficiencies, international collaboration also brings inherent risks that need to be understood. Here is an overall view of the CSA environment.

Strategic Context of the Canadian Space Agency

International Context

International cooperation is crucial to the implementation of the Canadian Space Strategy. Canada is working in partnership with other space faring nations, particularly through its longstanding relations with the National Aeronautics and Space Administration (NASA) and the European Space Agency (ESA). Through these partnerships, Canada can leverage its resources and maximize its return on investment while sharing technical expertise, knowledge, and infrastructure. In addition, there are increasing concerns over issues such as space weather, space debris and climate change which transcend national borders and promote increased cooperation among nations. Canada's space infrastructure must not only meet national strategic needs, but must also play a tangible role in responding to issues of interest to the international community.

Canada is regarded as a reliable partner that possesses unique technical and scientific capabilities. This is why foreign space agencies turn to Canada for their initiatives requiring leading-edge expertise. In particular, emerging space-faring countries in Asia and South America, offer great potential for future cooperation. Thus, Canada must continue to deploy efforts to gain a foothold in these emerging markets. It is of paramount importance that the Canadian Space Agency (CSA) continues to work with its stakeholders to ensure that optimal solutions are derived to address the needs of Canadians in space and to promote the competitiveness of our research and business communities in world markets. The Annual Survey of the Canadian Space Sector revealed a total annual revenue of $3.439 billion in 2010, half of which ($1.703 billion) was derived from exports.

Export Revenues Distribution[1]

	2007 ($ in millions)	2008 ($ in millions)	2009 ($ in millions)	2010 ($ in millions)
Exports Revenues	993	1,405	1,492	1,703
Annual Revenues	2,372	2,794	3,025	3,439
	40%	**50%**	**49%**	**50%**

[1] CSA: State of the Canadian Space Sector 2010; Overall Revenues, Domestic vs Export Revenues.

Export Revenues Distribution per Region[2]

	2007 ($ in millions)		2008 ($ in millions)		2009 ($ in millions)		2010 ($ in millions)	
United States	499	50%	733	52%	782	52%	850	50%
Europe	283	28%	399	28%	408	27%	525	31%
Asia	120	12%	150	11%	152	10%	154	9%
Oceania	48	5%	51	4%	56	4%	47	3%
South America	32	3%	52	4%	64	4%	70	4%
Africa	6	1%	11	1%	8	1%	17	1%
Other	5	1%	9	1%	22	1%	41	2%
Total	**993**	**100%**	**1,405**	**100%**	**1,492**	**100%**	**1,703**	**100%**

In 2010, the main destinations of Canadian exports were:

- The United States which remained the largest market accounting for 50% (or, $850 million) of the $1.703 billion of total exports;
- Europe was a strong second, accounting for 31% (or, $525 million);
- Export revenues from Asia increased by 1% from $152 to $154 million;
- Export revenues from Oceania decreased by 16%, from $55.6 to $46.7 million;
- Export revenues from South America increased by 9%, from $64 to $69.6 million; and,
- Export revenues from Africa increased by 120%, from $7.8 to $17 million.

National Context

The CSA recognizes that the best means of turning scientific and technological advancements into innovative products and services is through partnerships with Canadian universities and businesses. The Canadian space sector is knowledge-intensive. Building on the strengths of 8,256 skilled workers, including 4,344 highly qualified personnel, the firms in this sector have acquired world-leading capabilities in niche areas such as Earth observation, space robotics, scientific instruments, telecommunications, and navigation satellites.

Given that the national market is relatively small, capitalizing on export revenue depends on the industry's ability to commercialize highly competitive products and services, and establish local and international partnerships. The CSA has programs and services that play essential roles in supporting the industry's effort to export the fruit of its scientific and technological advances.

A mature segment of the industry, the Satellite Communications sector generated 79% of Canada's $3.438 billion in space sector revenues in 2010. Moreover, the sector saw a revenue increase of 8.4% (from $2.326 billion to $2.729 billion) over a one-year period.

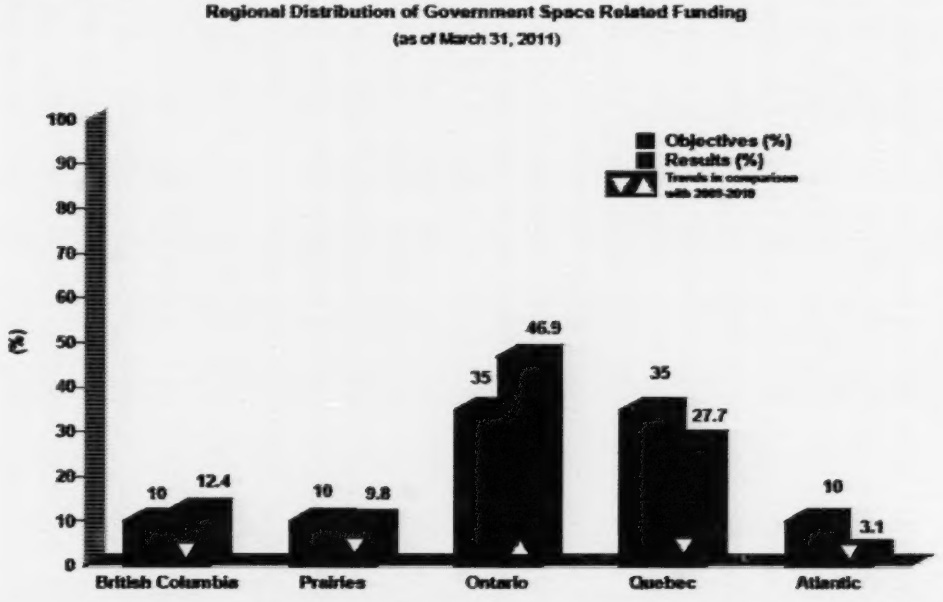
[2] CSA: State of the Canadian Space Sector 2010; Export Revenues per Region.

Domestic Revenues[3]

	2007 ($ in millions)		2008 ($ in millions)		2009 ($ in millions)		2010 ($ in millions)	
Satellite Communications	1832	77.2%	2,146	76.8%	2,326	76.9%	2729	79.4%
Navigation	155	6.5%	254	9.1%	243	8.0%	260	7.6%
Earth Observation	168	7.1%	200	7.2%	258	8.5%	256	7.4%
Robotics	103	4.3%	110	3.9%	114	3.8%	106	3.1%
Space Science	102	4.3%	68	2.4%	61	2.0%	62	1.8%
Other areas of Space activities	13	0.5%	16	0.6%	24	0.8%	25	0.7%
Total	**2373**	**1**	**2794**	**1**	**3026**	**1**	**3438**	**1**

Regional Development

To encourage sustainable industrial regional development and to maximize benefits to all Canadians, the CSA uses the following regional distribution objectives as guidelines for its investments in space. The data presented in the graph below accounts for the regional distribution of all Government space-related funding for the period from April 1988 to March 2011.



Source: CSA Organized Research Information System (ORIS), March 31, 2011.

To learn more about organizations involved in Canada's space industry, go to: http://www5.asc-csa.gc.ca/eng/industry/csd.asp

[3] CSA: State of the Canadian Space Sector 2010.

Corporate Risks Related to the Space Sector

The CSA constantly deals with a variety of issues that present particular challenges and risks specific to the field of space and therefore require mitigation plans. As an example, partnerships with other international space agencies which are essential for sharing technical expertise, knowledge and infrastructure, can also create delays in activity plans, schedules and financial management strategies because of decisions pertaining to their own space programs.

Space projects use innovative technologies that are, at times, first tested under the rigorous conditions of space. The technical challenges are such that risk mitigation actions may cause delays during project development phases. One alternative is to invest in early technology development prior to the development of projects.

A Renewed Integrated Corporate Risk Management Process

In 2011-2012, the CSA completed a substantial review of its risk management according to Treasury Board Secretariat (TBS) *Framework for the Management of Risks*. The approval and implementation of a renewed integrated risk process will lead to an updated Corporate Risk Profile in 2012-2013.

The new CSA's integrated risk management process includes broad principles and definitions of risks to be addressed distinctly from project management issues. It highlights the need to identify the propensity of corporate risks to preclude the achievement of expected results outlined in the PAA Performance Measurement Framework to increase the use of lessons learned from past mitigation plans; and, to clarify roles and responsibilities of all key personnel. The resulting Corporate Risk Profile will enlighten decision-making and help the CSA achieve its expected results at the lowest possible cost.

The updated Corporate Risk Profile will identify the severity and tolerance of corporate risks for every element of the PAA. It will describe the key potential risks and opportunities that can either compromise or support the achievement of expected results and will introduce a scale of likelihood and consequences as well as an overall severity level. More specifically, it will precisely pinpoint the potentially impacted areas, the stakeholders affected along with their respective level of risk tolerance, the optimal measures for the mitigation and/or the exploration of opportunities.

Once fully implemented during fiscal year 2012-2013, the renewed integrated risk management process will support the provision of information required for open, traceable and accountable decision-making as expected and assessed under the Management Accountability Framework.

The three following elements will contribute to the successful development of an updated Corporate Risk Profile at the CSA:

- The recognition of the importance of risk management as a "critical management competencies" for organizational strength and as a necessary practice to achieve results at the lowest possible cost.
- A horizontal and proactive collaboration and engagement of all actors in systematic analyses, identification and management of corporate risks.
- The creation of a risk management centre of expertise that supports the development of policies, procedures, guidelines, processes, best practices, training and learning plans in order to facilitate and foster excellence in the active application of Integrated Risk Management.

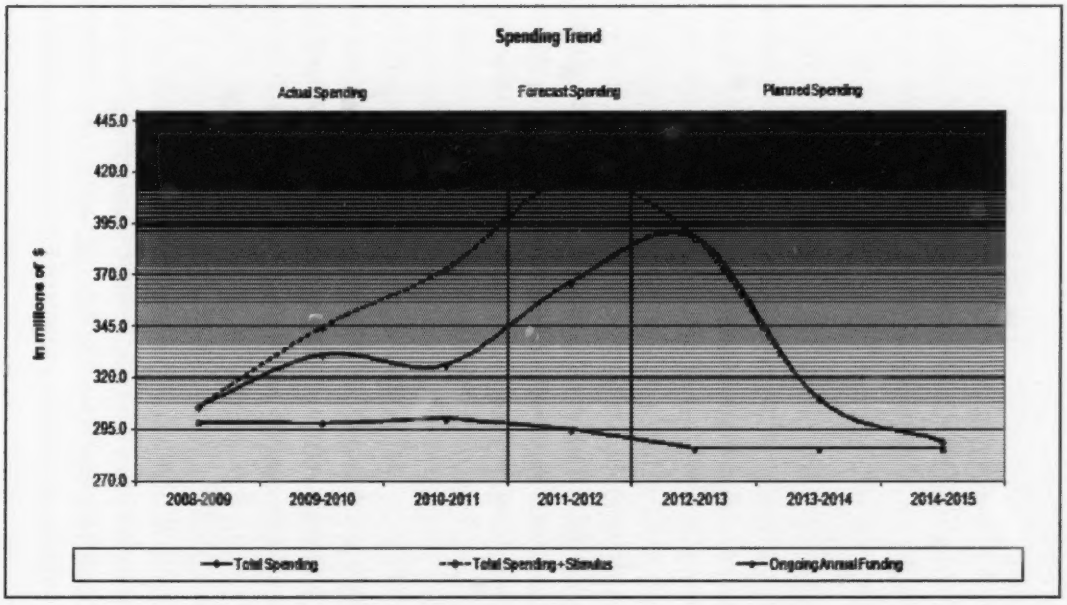
1.6 EXPENDITURE PROFILE

1.6.1 Departmental Planned Spending and Full-Time Equivalents (FTEs)

($ in millions)	Forecast Spending 2011-2012	Planned Spending 2012-2013	Planned Spending 2013-2014	Planned Spending 2014-2015
Space Data, Information and Services	136.6	**156.2**	98.7	78.4
Space Exploration	152.4	**100.0**	93.6	93.0
Future Canadian Space Capacity	86.1	**63.3**	70.8	70.9
Internal Services[1]	49.4	**43.7**	46.6	46.8
Budgetary Main Estimates (gross)	424.6	**363.2**	309.7	289.1
Non-Budgetary Main Estimates (gross)				
Less: Respendable Revenue				
Total	424.6	**363.2**	309.7	289.1
Adjustment[2]				
Supplementary Estimates				
Reinvestment of royalties from the sale of RADARSAT-1 data	0.8			
Capital Budget Carry Forward	7.2			
Operating Budget Carry Forward	7.2			
Reimbursement of eligible pay list expenditures	4.1	**1.3**		
Transfer to Shared Services Canada	(3.5)			
Anticipated Capital Budget Carry Forward (from 2011-2012 to 2012-2013)	(23.7)	**23.7**		
Total Adjustments	(7.9)	**25.0**	0.0	0.0
Total Planned Spending	416.8	**388.3**	309.7	289.1
Full-Time Equivalents	700.5	687.0	687.0	687.0

Notes:
1. Internal Services: The increase of planned spending from $43.7 million in 2012-2013 to $46.6 million in 2013-2014 is mainly due to building maintenance and security for the J. H. Chapman Space Centre (CSA Headquarters) and David Florida Laboratory.
2. Adjustments are to accommodate approvals obtained since the Main Estimates and include Budget Initiatives, Supplementary Estimates, etc.
3. Total Planned Spending and Full-Time Equivalents: Starting in 2012-2013, the A-Base budget will decrease from $300 million to finally reach $285.7 million by 2014-2015. The reduction of FTEs will take place in 2012-2013. Budget reductions are largely due to the completion of early phases of major projects supported through contracts with industry. At this time it is anticipated that these projects will continue and therefore staff reductions are not commensurate with overall budget reductions in order to ensure continuity in these projects.
4. Due to rounding, decimals may not add up totals shown.

1.6.2 Spending Trend



The CSA's annual A-Base budget of $300 million was set in Budget 1999 but the difference in the spending trend shown above is mainly attributable to the following factors:

- The cumulative impact of the reprofiling of funds associated with the sound management of high-risk projects and programs (e.g., high technology risks, long term development cycle, uncertainties with work schedules, implementation delays).

- The incremental funds for the RADARSAT Constellation program following the government decision to provide CSA with additional $111 million over five years (2005-2006 to 2009-2010) to work with the Canadian space industry on developing the next generation of advanced radar remote sensing satellites.

- In Budget 2009, Canada's economic action plan (Action to Support Businesses and Communities) provides the Canadian Space Agency with $110 million over three years so that it can contribute to the development of terrestrial prototypes for space robotic vehicles, such as the Mars Lander and Lunar Rover, and for the further development of other technologies and space robotics. The Canadian Space Agency plays an important role by working with the private sector to support advanced research, development and prototyping for new space-based technologies.

- In Budget 2010, CSA was granted a sum of $397 million over five years (2010-2011 to 2014-2015) to develop the RADARSAT Constellation Mission of which $96.2 million have received spending authority from Treasury Board and therefore included in the above.

- On August 4, 2011, an Order in Council (OIC) established Shared Services Canada as part of the Public Works and Government Services Canada portfolio to streamline and reduce duplication in the government's information technology services. Shared Services Canada will consolidate the resources and personnel currently supporting email, data centres and networks and associated internal services. In 2011-2012, unexpended authorities related to functions transferred to Shared Services Canada correspond to $3.5 million. This transfer of authorities will be reflected in Public Accounts at the end of the year. Starting in 2012-2013, CSA transferred $7.2 million to Shared Services Canada.

1.7 ESTIMATES BY VOTE

For more information on our organizational votes and/or statutory expenditures, please see the 2012-2013 Main Estimates publication. An electronic version of the Main Estimates is available at http://www.tbs-sct.gc.ca/est-pre/index-eng.asp.

SECTION 2: ANALYSIS OF PROGRAM ACTIVITIES BY STRATEGIC OUTCOME

2.1 CANADIAN SPACE AGENCY STRATEGIC OUTCOME

All CSA Program Activities contribute to a single strategic outcome: *Canada's exploration of space, provision of space services and development of its space capacity meet the nation's needs for scientific knowledge, innovation and information.*

Strategic Outcome Measurement Challenges

The CSA realizes that benefits from Science and Technology (S&T) programs are not easily measurable because of the indirect nature of research impacts, the increment nature of research results from the world-wide knowledge base and the 5 to 10 year timeframe needed to assess such impacts. However, in order to overcome this challenge, the CSA initiated a process to document all space-related projects undertaken by the members of the Federal Science and Technology Community. This initiative aims at aligning the measurement, reporting and evaluation of federal-sponsored S&T activities. Such approach is expected to standardize and therefore, convey more appropriately to Canadians, the outcomes commonly generated by science and technology programs related to space.

Over the years, the strategic outcome will be monitored through the three following indicators:

1. Depth and width of needed scientific knowledge: The CSA already conducts in-house measurement of certain outputs such as the number of publications produced from space research. To hone its approach, the CSA is considering the establishment of a pluriannual bibliometric study which will list the number of publications, citations and type of audiences associated with the fields of knowledge that are priorities for Government of Canada (GoC) organizations.

2. Space generated innovation index: Government of Canada and private sector organizations collect and publish a large amount of aggregate information on innovation. The CSA must improve its capacity to report more quantifiably on the impact of its programs on Canadian innovation. The CSA intends to draw from the performance measurement methods developed by the Organization for Economic Cooperation and Development (OECD), building on the partnership created since 2006 between the CSA and others members of the OECD Space Forum.

3. Acknowledgement/success stories by GoC organizations of impact on mandate delivery: The measurement of this indicator relies on the capability of the GoC organizations to systematically acknowledge the benefits obtained from applications developed with the support of the CSA. Longitudinal information will be collected jointly with the GoC organizations in order to analyse the impact of the support provided by the CSA on the delivery of their programs.

2.2 PROGRAM ACTIVITIES

Space Data, Information and Services

Description: This Program Activity includes the provision of space-based solutions (data, information and services) and the progression of their utilization. It also serves to install and run ground infrastructure that processes the data and operates satellites. This Program Activity utilizes space-based solutions to assist Government of Canada (GoC) organizations in delivering growing, diversified or cost-effective programs and services within their mandate, which is related to key national priorities, such as sovereignty, defence, safety and security, resource management, environmental monitoring and the North. It also provides academia with data required to perform its own research.

The services delivered through this Program Activity are rendered, and the data and information are generated and processed, with the participation of the Canadian space industry, academia, GoC organizations, national and international organizations, such as foreign space agencies, not-for-profit organizations, as well as provincial and municipal governments. This collaborative effort is formalized under national and international partnership agreements, contracts, grants or contributions.

SPACE DATA, INFORMATION AND SERVICES PROGRAM ACTIVITY PERFORMANCE MEASUREMENT	
Expected Result #1	**Performance Indicator**
The GoC organizations offer more diversified or cost-effective programs and services due to their utilization of space-based solutions.	1. Number of GoC programs and number of different themes serviced by space-based solutions. New success stories of improved efficient/effective departmental mandate delivery due to space-based solutions.
Planning and Reporting Continuity: RPP 2011-2012 and DPR 2010-2011: http://www.asc-csa.gc.ca/asc/eng/resources/publications/default.asp#parliament	

RESOURCES	2012-2013	2013-2014	2014-2015
FINANCIAL ($ in millions)	173.7	98.7	78.4
HUMAN (FTEs)	107.4	104.6	100.6

Summary of Planning Highlights for Space Data, Information and Services

In order to serve the evolving priorities of the Government of Canada, and the needs of Canadians, the CSA will:

Complete Ongoing Projects

- Complete the design of the RADARSAT Constellation Mission (RCM) with a Mission Critical Design Review (CDR) approved by stakeholders. The launch of the first satellite is planned to occur in fiscal year 2016-2017 followed a year later by the other two satellites. While ensuring continuity of space data from its predecessors RADARSAT-1 and -2 for many government departments, the RCM will enhance Canada's ability to use space-based solutions for operational maritime surveillance, disaster management and ecosystem monitoring and will support the strategic objectives of Canada on security and sovereignty, particularly in the Arctic.

- Prepare for the launch of CASSIOPE, a mission that will demonstrate both the Canadian small satellite bus capability and the future space-based digital courier system named CASCADE. It is also expected to bring scientific returns with the ePOP instrument built to help understand particle exchange and energy coupling processes between the Earth's atmosphere and space environment.

- Finalize the manufacturing, integration and testing of the M3MSat Satellite for launch in 2013. This joint CSA-Departmental National Defense (DND) micro-satellite project will demonstrate and further develop a multi-mission micro-satellite bus capability, establish the operation of micro-satellites as cost-effective, allow the optimization of the Automatic Identification System (AIS) payload in maritime traffic identification and significantly support Canadian industry business development strategies in a global market context. M3MSat is a complement to CSA's RADARSAT Constellation and DND's Polar Epsilon missions.

Ensure Integrity of Services

- Continue to develop the Chemical and Aerosol Sounding Satellite (CASS) mission concept which is a follow on to the successful SCISAT-1 mission, entering its ninth year of operation. CASS will continue the atmospheric composition and air quality measurements, monitor the chemistry influencing ozone recovery, and provide new science on how the surface climate influences the upper troposphere/lower stratosphere region. The Canadian instruments can be either flown on a foreign or Canadian spacecraft.

- Keep managing and optimizing the remaining $321 million out of the initial $445 million worth of prepaid RADARSAT-2 data. This close monitoring of SAR data utilization by operational Government is deployed to ensure users' needs are met in a sustainable way. Fourteen departments are taking advantage of RADARSAT

many capabilities and making long term investments to develop new capabilities within the departments by either bringing applications closer to an operational status or by finding ways to improve the use of the data in order to better fulfill their mandate. DND's Polar Epsilon Project is expected to become one of the largest users of SAR data in Canada together with Environment Canada.

- Continue satellite data application development and Earth Observation (EO) utilization activities, to support the growth of EO needs or capabilities within Government of Canada and the service industry. With 22 ongoing contracts, including ten to develop innovative applications to support water management, the industry will have many opportunities to provide high-value solutions to the Government of Canada while improving their competitiveness. The SARWind project with Environment Canada will be of particular interest. Building on the accomplishments of the MENTOR project initiated by the private sector, it will be in final integration and validation phases before becoming operational within the Meteorological Services Canada. It will the first operational SAR satellite space-based monitoring for improving wind analysis and short-range prediction over large marine areas, and especially in the coastal zones.

- Continue to support MOPITT and OSIRIS, two major Canadian science instruments that are currently orbiting Earth and collection atmospheric environment data. MOPITT, on NASA's Terra satellite, measures pollutants in the troposphere, providing a wealth of data on global transport of pollutants while OSIRIS, on the Swedish Odin satellite, measures ozone in the stratosphere and mesosphere and provides important data to assess and predict the health of the ozone layer.

Maintain Partnerships

- Continue to support the development of a sophisticated Enhanced Interaction Klystron (EIK) that will be at the heart of the interferometric radar instrument on the Surface Water and Ocean Topography (SWOT) mission being developed by NASA Jet Propulsion Laboratory and the French Space Agency (CNES - *Centre national d'études spatiales*) for launch in 2019. SWOT will allow measurement of lake level and ocean circulation features and will be of great utility to Environment Canada for hydrological and meteorological monitoring and forecasting, and to Fisheries and Oceans Canada for ocean science and forecasting.

- Continue to leverage international efforts by playing a tangible role and being a reliable partner in international organizations. The CSA is holding chairmanship of the International Charter *Space and Major Disasters*, to use EO satellites in response to disasters until mid-2012. The CSA continues to regularly provide RADARSAT-1 and -2 data and strategic EO-derived information products upon Charter activation, thus contributing to help mitigating the effects of disasters on human life in Canada and around the world.

Invest in Research and Development (R&D)

- Continue the analysis of the requirements and delivery mechanisms for the Polar Communications and Weather (PCW) Mission, including Private-Public-Partnership (PPP) in order to find the most efficient way to respond to the needs expressed by Government of Canada organizations and Northern communities in Canada. If approved, the mission will facilitate Canadian operations in the North and support Canadian sovereignty by providing reliable communications services and timely meteorological information for civilian and military operations.

Benefits for Canadians from this Program Activity

Space assets produce many benefits for Canadians. More specifically, the following are a few examples of the positives impacts arising from synergistic collaboration between the CSA and Government of Canada organizations.

The Department of National Defence is rapidly increasing its capacity to use space assets to deliver its mandate with the construction and operation of satellite data reception stations in Canada. The main objective is to use space capabilities to enhance the security and protection of Canadians, both at home and abroad.

Environment Canada is the largest user of satellite data within the Government of Canada. Space data is critical to the department's core mandate, including weather and air quality forecasting, environmental and ice monitoring, enforcement of environmental laws and regulations, climate change studies, and the science required to improve weather and environmental forecasts for Canadians.

Natural Resources Canada (NRCan) is a key user and provider of space data within the Government of Canada as it is mandated under the Department of Natural Resources Act to *'promote the development and use of remote sensing technology'*. In doing so, NRCan receives, uses, archives and disseminates Canadian and international satellite data. It uses space data to deliver its core mandate of mapping the Canadian landmass, managing natural resources, assessing natural hazards and maintaining the Canadian Spatial Reference System.

The Department of Fisheries and Oceans uses space data and information to support safe navigation, maritime surveillance, and, ocean science and observations. It relies on accurate and timely satellite imagery of ice, allowing the Canadian Coast Guard to direct icebreaking activities in a more efficient and effective way.

To learn more about Space Data, Information and Services Program Activity, go to: Section 2 of the *"Analysis of Program Activities by Strategic Outcome – Detailed Information"* posted on the CSA's website at:
http://www.asc-csa.gc.ca/asc/eng/resources/publications/default.asp#parliament

To learn more about Earth observation, go to:
http://www.asc-csa.gc.ca/asc/eng/satellites/default.asp?page=observation

To learn more about satellite communications, go to:
http://www.asc-csa.gc.ca/asc/eng/satellites/default.asp

Space Exploration

Description: This Program Activity provides valuable Canadian science, signature technologies and qualified astronauts to international space exploration endeavours. This Program Activity contributes to the Government of Canada's Science and Technology Strategy. It fosters the generation of knowledge as well as technological spin-offs that contribute to a higher quality of life for Canadians. It generates excitement within the population in general and contributes to nation-building. This Program Activity appeals to the science and technology communities. It is targeted mostly towards Canadian academia and international space exploration partnerships. Canadian industry also benefits from the work generated within this Program Activity.

This Program Activity is delivered with the participation of foreign space agencies and Government of Canada (GoC) organizations. This collaborative effort is formalized under international partnership agreements, contracts, grants or contributions.

SPACE EXPLORATION PROGRAM ACTIVITY PERFORMANCE MEASUREMENT	
Expected Result #1	**Performance Indicator**
Expansion of scientific knowledge acquired through space exploration endeavours.	1. Number of peer-reviewed scientific publications, reports and conference proceedings using space exploration information and produced by researchers (sciences and technologies) in Canada.
Expected Result #2	**Performance Indicator**
Multiple use and applications of knowledge and know-how acquired through space exploration endeavours.	1. Number of terrestrial applications and of space re-utilization of knowledge and know-how acquired through space exploration endeavours.
Planning and Reporting Continuity: RPP 2011-2012 and DPR 2010-2011: http://www.asc-csa.gc.ca/asc/eng/resources/publications/default.asp#parliament	

RESOURCES	2012-2013	2013-2014	2014-2015
FINANCIAL ($ in millions)	106.3	93.6	93.0
HUMAN (FTEs)	196.1	192.3	188.0

Summary of Planning Highlights for Space Exploration

Complete Ongoing Projects

- The Canadian astronaut Chris Hadfield is pursuing his training to become the first Canadian to command the International Space Station (ISS) and its crew and will be the second Canadian to undertake a 6 months mission to the ISS. Mr Hadfield is planned to live and work on the ISS from November 2012 to May 2013. The two newest Canadian astronauts are now eligible for long-duration space flight assignments to the ISS and continue training on various ISS Partners' segments while assuming collateral duties in support to the ISS Program and CSA priorities.

- The CSA will see the launch of the Near Earth Object Surveillance Satellite (NEOSSat). The microsatellite jointly sponsored by CSA and DND's Defence Research and Development Canada will acquire metric data on Near Earth-orbiting objects (asteroids) and man-made objects (spacecraft and space debris). Hundreds of images per day will be analyzed by the University of Calagary's science operations centre. Through NEOSSat, Canada is contributing to the international effort to both catalogue the near-Earth population of asteroids producing information crucial to targeting new destinations for future space exploration missions and to maintain the safety of Canadian and international space assets, both civilian and military in an increasingly cluttered space environment.

Ensure Integrity of Services

- The CSA will continue to fulfill its International Space Station mandate to maintain and operate the Mobile Servicing System (MSS), and, to optimize and extend its initially designed operational life of 15 year to support the space station until 2020 and beyond.

Maintain Partnerships

- The CSA will improve coordination of space research through its continued participation in international space life sciences working groups. For example, through the International Space Life Sciences Working Group, CSA works with NASA, the European Space Agency, and Japanese, German, French and Italian space agencies to collaborate on space life sciences and multinational, world-class scientific research conducted on the ISS. Proposals that were selected in 2009 will be developed for execution on the ISS during the 2012-2014 timeframe.

- The CSA will continue to participate actively in the International Space Exploration Coordination Group (ISECG). In 2012, the ISECG will be chaired by CSA and will present the second iteration of the Global Exploration Roadmap for robotics and human exploration of the Moon, Mars and Asteroids, and will develop an international approach on the measurement of the space exploration benefits.

- The CSA will continue its international collaboration on important astronomy and planetary exploration missions, such as the development of a Fine Guidance Sensor (FGS), a key component of the James Webb Space Telescope to be launched in 2018. CSA's contribution will guarantee Canadian astronomers access to 5% of the observing time. The CSA will also continue its participation to JAXA Astro-H mission and will continue to evaluate the potential for participation in missions such as ESA Euclid to ensure that Canadian astronomers continue to play a leading role in international astronomy discoveries.

Invest in Research and Development (R&D)

- The CSA will continue to work with its industrial contractor team to deliver the second of two projects under the *Stimulus* initiative on space robotics announced as part of Canada's Economic Action Plan. The initiative to be completed in 2012-2013 using CSA's funding is developing terrestrial prototypes of different rovers and their associated technologies for Moon and Mars exploration.

- The CSA will continue to expand the use of ground control operations of Canadarm 2 and Dextre on the ISS to free up on-orbit crew time. In return, the CSA will continue to access the unique environment of the ISS as a platform for microgravity and extreme environment research in areas such as neuroscience, vascular studies, radiation and on-orbit health diagnostic technologies. The CSA will develop a new vision system to detect approaching vehicle to be launched in 2014 in collaboration with NASA.

- The CSA will continue its investments in exploration of Mars, by first analysing the data of the APXS instrument on the NASA Curiosity rover currently enroute to the Red Planet. It will also continue its participation to the MATMOS instrument to analyse Mars atmosphere and to the NASA OSIRIS-Rex mission toward an asteroid. The CSA will also continue to work with NSA and ESA to evaluate potential participation in future Mars and Moon robotic missions.

Benefits for Canadians from this Program Activity

The International Space Station is an excellent example of mutually beneficial collaboration among space-faring countries. Through our contribution to specialized technologies, Canadian astronauts and scientists have special access to a unique microgravity laboratory for conducting scientific and engineering studies. These priority research areas have great potential for creating the new knowledge that will improve how we live, prosper and develop on our planet.

Space exploration and scientific and technological initiatives provide opportunities for Canada to take part in the exploration of Mars. Increasing our understanding of Mars would improve our understanding of the Earth, especially about our atmosphere and magnetic field. Complementing the scientific advancements stemming from planetary exploration, is the development of exploration vehicles and their associated robotic technologies challenges including the use, for example, of solar-powered electric propulsion, which, in turn, could lead the way to the spin-off commercialization of green technologies.

Space astronomy provides an additional platform for Canadian astronomers and space industry to build on existing strengths and achieve global levels of excellence. The participation of Canada to the James Webb Space Telescope is a perfect example.

To learn more about Space Exploration Program Activity, go to Section 2 of the *"Analysis of Program Activities by Strategic Outcome – Detailed Information"* posted on the CSA's website at:
http://www.asc-csa.gc.ca/asc/eng/resources/publications/default.asp#parliament

To learn more about space science and exploration, go to:
http://www.asc-csa.gc.ca/asc/eng/sciences/default.asp and,
http://www.asc-csa.gc.ca/asc/eng/exploration/default.asp

Future Canadian Space Capacity

Description: This Program Activity attracts, sustains and enhances the nation's critical mass of Canadian space specialists, fosters Canadian space innovation and know-how, and preserves the nation's space-related facilities capability. In doing so, it encourages private-public collaboration that requires a concerted approach to future space missions. This Program Activity secures the nation's strategic and ongoing presence in space in the future and to preserve Canada's capability to deliver internationally renowned space assets for future generations. It is targeted at Canadian academia, industry and youth, as well as users of Canadian space solutions (Government of Canada (GoC) organizations) and international partners.

This Program Activity is conducted with the participation of funding agencies, GoC organizations along with government facilities and infrastructure, foreign space agencies, not-for-profit organizations and provincial governments. This collaborative effort is formalized under contracts, grants, contributions or national and international partnership agreements.

FUTURE CANADIAN SPACE CAPACITY

PROGRAM ACTIVITY PERFORMANCE MEASUREMENT

Expected Result #1	Performance Indicators
Canada has a space community (academia, industry and government) able to contribute to the sustained and strategic Canadian use of space.	1. Vitality index of the Canadian space community-measured in terms of: Number of HQP/total of FTE; Value of public and private R&D investments; Value of public and private development facilities; Number of technology domains covered; Number of university space related programs. 2. Degree of match between workforce supplied and space community (industry and government) workforce requirements.

Planning and Reporting Continuity:

RPP 2011-2012 and DPR 2010-2011:
http://www.asc-csa.gc.ca/asc/eng/resources/publications/default.asp#parliament

RESOURCES	2012-2013	2013-2014	2014-2015
FINANCIAL ($ in millions)	63.3	70.8	70.9
HUMAN (FTEs)	116.5	122.2	122.8

Summary of Planning Highlights for Future Canadian Space Capacity

Complete Ongoing Projects

- A new stratospheric balloon launch infrastructure will begin development by CSA in Canada to support the access to balloon flights for the training of scientists and engineers, as well as for the creation of science opportunities, in collaboration with the French Space Agency.

Ensure Integrity of Services

- The CSA intends to make its David Florida Laboratory (DFL) research facilities more accessible and available to academia and the Canadian space industry. The DFL will continue to provide world-class and cost-effective environmental space qualification services for the assembly, integration and testing of spacecraft systems to CSA's programs, Government of Canada organizations as well as national and international commercial clients.

Maintain Partnerships

- CSA will consult the Canadian space sector (industry and academia) and relevant GoC organizations in preparation for the 2012 European Space Agency (ESA) Ministerial Council meeting during which ESA Member states and Canada will announce new contributions to the proposed ESA Programs.

- The CSA will continue to participate actively in the International Space Debris Coordination Committee (IADC). This committee is an international government forum of 12 Space Agencies, for the global coordination of research activities related to growing threat from man-made and natural debris in space. CSA access to space debris research activities will minimize potential threats to Canadian space assets which have to be manoeuvred more and more frequently to avoid collisions with space debris. Canada will host the next IADC annual meeting in May 2012.

Invest in Research and Development (R&D)

- The CSA will continue to provide support and training to scientists and engineers through two new initiatives: the selection and creation of research clusters and the selection of projects for flight on sub-orbital platforms, both through competitive announcements of opportunities; approximately 20 new projects are currently funded for a 3 year period.

- On the basis of the results for the CSA's long-term roadmaps' exercise for space technology development and depending on the requirements for future missions, the CSA will issue R&D contracts in areas that have been selected after consultation with government, industry and academia. The CSA will continue to task industry and research organizations to work on designated priority technologies in order to mitigate risks and contribute to the enhancement of Canadian capabilities.

Benefits for Canadians from this Program Activity

Canada's future space capacity resides within academia, the space industry and government departments and agencies. By investing in programs that stimulate innovation within the space community and encouraging the competitiveness of our high-tech companies, the CSA contributes to the creation and sustainability of Canada's knowledge-based economy. However, it is important to note that the investments under this Program Activity are meant to generate long-term benefits.

For example, the CSA's program, Space Expertise and Proficiency, promotes the education and training of the highly educated and highly skilled labour force of tomorrow. The CSA program "Space Innovation and Market Access" promotes dynamic trade relationships with other nations, thereby increasing the ability of our Canadian companies to compete in the global marketplace on a medium- and long-term basis. There are significant economic advantages for Canada and quality-of-life benefits for Canadians in a constantly growing space industry, which currently has 200 organizations employing over 7,500 highly skilled engineers, scientists and researchers.

The CSA will also work at maintaining and developing the capacity and expertise of its scientific and technical staff by providing opportunities to contribute to leading-edge priority activities in cooperation with academia, industry and GoC organizations.

To learn more about Future Canadian Space Capacity Program Activity, go to Section 2 of the *"Analysis of Program Activities by Strategic Outcome – Detailed Information"* posted on the CSA's website at:
http://www.asc-csa.gc.ca/asc/eng/resources/publications/default.asp#parliament:

To learn more about enabling technology development, go to:
http://www.asc-csa.gc.ca/eng/programs/default.asp

To learn more about qualifying and testing services go to:
http://www.asc-csa.gc.ca/asc/eng/dfl/default.asp

To learn more about space awareness and learning, go to:
http://www.asc-csa.gc.ca/asc/eng/educators/default.asp

Internal Services

Description: In accordance with the Management Accountability Framework this Program Activity serves to implement the Government's commitment to modern Public Service management. Internal Services include only those activities and resources that apply across an organization in the areas of Governance and Management Support which includes Management and Oversight Services, Communications Services, and Legal Services; Resource Management which includes Human Resources Management Services, Financial Management Services, Information Management Services and Information Technology Services; and Asset Management which includes Real Property Services, Material Services and Acquisition Services.

INTERNAL SERVICES PROGRAM ACTIVITY PERFORMANCE MEASUREMENT	
Expected Result #1	**Performance Indicator**
Internal Services provide an added value to CSA managers in the performance of their duties.	1. CSA's rating against MAF criteria based on Round 2012-2013 assessment.
Planning and Reporting Continuity: RPP 2011-2012 and DPR 2010-2011: http://www.asc-csa.gc.ca/asc/eng/resources/publications/default.asp#parliament	

RESOURCES	2012-2013	2013-2014	2014-2015
FINANCIAL ($ in millions)	45.0	46.6	46.8
HUMAN (FTEs)	267.0	267.9	275.7

Summary of Planning Highlights for Internal Services

In order for the CSA to have its management practices meet the standards set by the Government wide policies and based on lessons learned from the Management Accountability Framework assessments, and Internal Audit recommendations, the following actions will be undertaken in 2012-2013:

Continued Governance Improvements

- The renewal of the CSA's investment selection governance and the approval and implementation of a first Investment Plan, in accordance with TBS policies on investment planning, acquired assets and management of projects.

- The continued development and implementation of the Project Management Methodology to standardize project management processes and practices.

- The continued development of an integrated planning approach in order to align human, financial and technical resources with the CSA's strategies, priorities and operations.

- The ongoing implementation of the 2010-2013 Integrated Corporate Human Resources Plan in line with the Program Activity Architecture and development of the 2013-2016 Plan in order to attract and retain a qualified workforce to deliver its mandate.

- The implementation of a renewed intellectual property policy.

Ensuring Business Continuity

- The implementation of a new approach to update the CSA Corporate Risk Profile and use it as a powerful decision making tool.

- The continued development and implementation of the CSA's Departmental Security Plan as required in the Policy on Government Security and evaluated with the Management Accountability Framework 2012-2013.

- The continued development and implementation of a new business continuity plan.

- The ongoing management of information assets created by or for the CSA in order to guarantee access for decision making, protection for security access and to conform to Canadian regulations, and to assure conservation for historical purposes.

Monitoring Performance

- The ongoing implementation of a five-year Evaluation Plan applicable to the CSA's 2011-2012 Program Activity Architecture as well as the continued development of Performance Measurement Strategies for each Program Activities.

- The ongoing implementation of the three-year (2011-2014) risk-based audit plan.

- The implementation of the CSA's PAA Performance Measurement Framework to be reported for the first time in the 2011-2012 Departmental Performance Report.

- The ongoing assessment of management requirements to allow public access to space data produced by satellites and scientific experiments.

- The continuous monitoring of management action plans developed in response to audit and evaluation as well as third party recommendations.

Benefits for Canadians from this Program Activity

Canadians will benefit from well-managed and efficient government operations while maintaining rigorous stewardship over financial resources, assets, and human resources, as well as from a transparent, accountable and responsive federal government.

To learn more about Internal Services Program Activity, go to Section 2 of the *"Analysis of Program Activities by Strategic Outcome – Detailed Information"* posted on the CSA's website at:
http://www.asc-csa.gc.ca/asc/eng/resources/publications/default.asp#parliament

SECTION 3: SUPPLEMENTARY INFORMATION

3.1 FINANCIAL HIGHLIGHTS

3.1.1 Future-Oriented Financial Statements

The Future-Oriented Condensed Financial Statements presented in this RPP are intended to provide a general overview of the CSA's financial operations. The Future-Oriented Condensed Financial Statements are prepared on an accrual basis to strengthen accountability and improve transparency and financial management.

Information on CSA's Future-Oriented Financial Statements is at the following address: http://www.asc-csa.gc.ca/eng/publications/default.asp#parliament

Future-Oriented
Condensed Statement of Operations
For the Year (Ended March 31)

($ in millions)	% Change	Forecast 2012-2013	Estimated Results 2011-2012
Expenses	N/A	364.08	480.76
Revenues	N/A	5.31	7.97
Net Cost of Operations		**358.77**	**472.79**

Condensed Statement of Financial Position
For the Year (Ended March 31)

($ in millions)	% Change	Forecast 2012-2013	Estimated Results 2011-2012
Assets	N/A	1,374.92	1,352.10
Liabilities	N/A	136.08	141.08
Equity	N/A	1,238.84	1,211.02
Total		**1,374.92**	**1,352.10**

Notes: 1. Percentage change: Not applicable because Forecasts and Estimated Results were not established on the same basis and therefore cannot be compared.
2. Due to rounding, decimals may not add up to totals shown.

3.1.2 Supplementary Information Tables

All electronic supplementary information tables found in the 2012-2013 Report on Plans and Priorities can be found on the Treasury Board of Canada Secretariat's website at: http://www.tbs-sct.gc.ca/est-pre/estime.asp

Annexe 1:	Details on Transfer Payment Programs (TPPs)
Annexe 2:	Sources of Respendable and Non-Respendable Revenue
Annexe 3:	Status Report on Transformational and Major Crown Projects
Annexe 4:	Summary of Capital Spending by Program Activity
Annexe 5:	Upcoming Internal Audits and Evaluations over the next three fiscal years

3.2 CSA CONTRIBUTIONS TO GOVERNMENT OF CANADA OUTCOMES

Contributions of Program Activities to Government of Canada outcomes are described in Section 2 of the *"Analysis of Program Activities by Strategic Outcome - Detailed Information"* posted on the Canadian Space Agency's website at: http://www.asc-csa.gc.ca/asc/eng/resources/publications/default.asp#parliament

3.3 INDEX OF CSA SPACE MISSIONS

The CSA space missions are described in Section 2 of the *"Analysis of Program Activities by Strategic Outcome - Detailed Performance Information"* posted on the Canadian Space Agency's website at: http://www.asc-csa.gc.ca/asc/eng/resources/publications/default.asp#parliament

SECTION 4: OTHER ITEMS OF INTEREST

4.1 ORGANIZATIONAL CONTACT INFORMATION

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